Finnish Air Force

UNIVERSITY OF JYVÄSKYLÄ

DETERMINANTS OF FIGHTER PILOTS´ FLIGHT-RELATED MUSCULOSKELETAL SYMPTOMS IN EARLY FLIGHT CAREER

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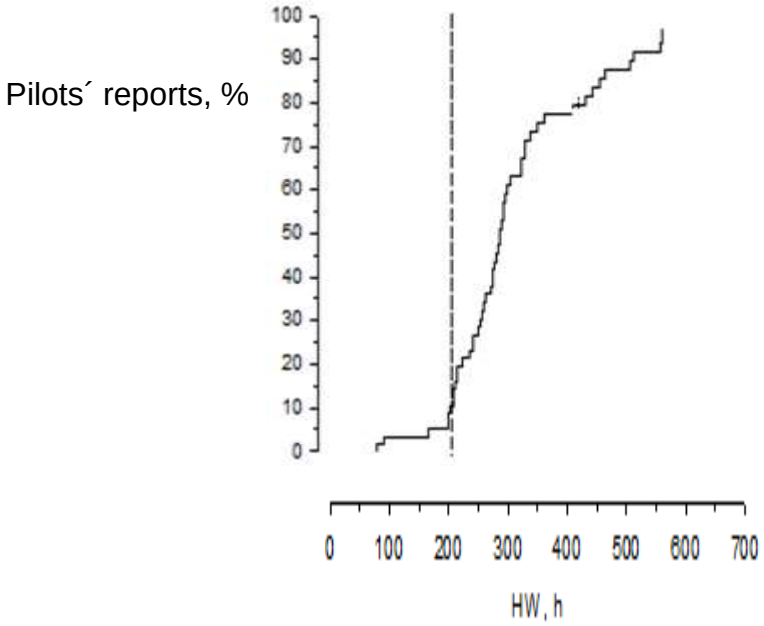
High work-related musculoskeletal symptoms (MSK) prevalence in the Finnish Air Force (FiAF)

1. 93% of the fast jet pilots have suffered at least one flight-related, disabling MSK phase during their career (Rintala et al. 2015 Mil Med)
    - *Bae Hawk jet trainer
    - *Saab Draken, MiG 21 and F-18 fighters
2. 10-13% of the pilots have entered to an occupational disease status (C-spine)
3. Almost 30% of the population have had continuous daily MSK symptoms

Flight-related MSK in FiAF

”Cut-off”-point: about 190 jet trainer hrs (N=299)



Flight-related MSK: the ”rookies”

Less is known about the early flight years:

-as a conscript

*Valmet Vinka (propeller plane)

-as a flight cadet

*Vinka training continues

*Bae Hawk begins

<table>
<tr><td rowspan="8">VALINTA</td><td colspan="3">Ilmasotakoulu
Tukilentolaivue</td><td colspan="2">Lentosotakoulu
Hävittäjälentolaivue 41</td><td colspan="4">Operatiivinen valmius
Lennostojen hävittäjälentolaivueet</td></tr>
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<tr><td colspan="3">Alkeis- ja peruskoulutus
Tikkakoski</td><td colspan="2">Jatko- ja taktinen koulutus
Kauhava</td><td colspan="4">HN5 Harjoitukset</td></tr>
<tr><td>Varusm.</td><td colspan="3">Kadettikurssi</td><td rowspan="3">Vaihe IV Taktinen koul. 130 h</td><td rowspan="2">HN1 Tyyppi 55 h</td><td rowspan="2">HN2 Valmius-ohjaaja</td><td rowspan="2">HN3 Parin-johtaja</td><td rowspan="2">HN4 Parven-johtaja</td></tr>
<tr><td>Vaihe I Alkeis-koul. 40 h</td><td>Vaihe II Perus-koul. 50 h</td><td>Vaihe III Jatko-koul. 90 h</td></tr>
<tr><td>1 vuosi</td><td colspan="3">4 vuotta</td><td colspan="5">1 vuosi</td></tr>
<tr><td colspan="6"></td><td colspan="4">Hawk-parvenjohtaja, ilmataisteluopettaja, harjoitukset
Lentosotakoulu</td></tr>
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Study questions

1.What kind of a MSK prevalence curve can be seen among Finnish young fighter pilots?

2.How much sick leave days does the flight-related MSK generate absolutely, but also compared with other typical complaints?

3.How does the flight-related MSK medical appointments differ from other typical appointments in a point of view of the prevalence?

4.Is pure physical performance somehow related with flight-duty induced MSK medical appointments?

Methods

-clinical follow-up, average 7,5 years (range 2-12)

*individual health monitoring (AMC, Air Base hospitals)

*careful diagnostics separation

¤flight-related MSK

¤other MSK

¤other common (flu, stomach etc.)

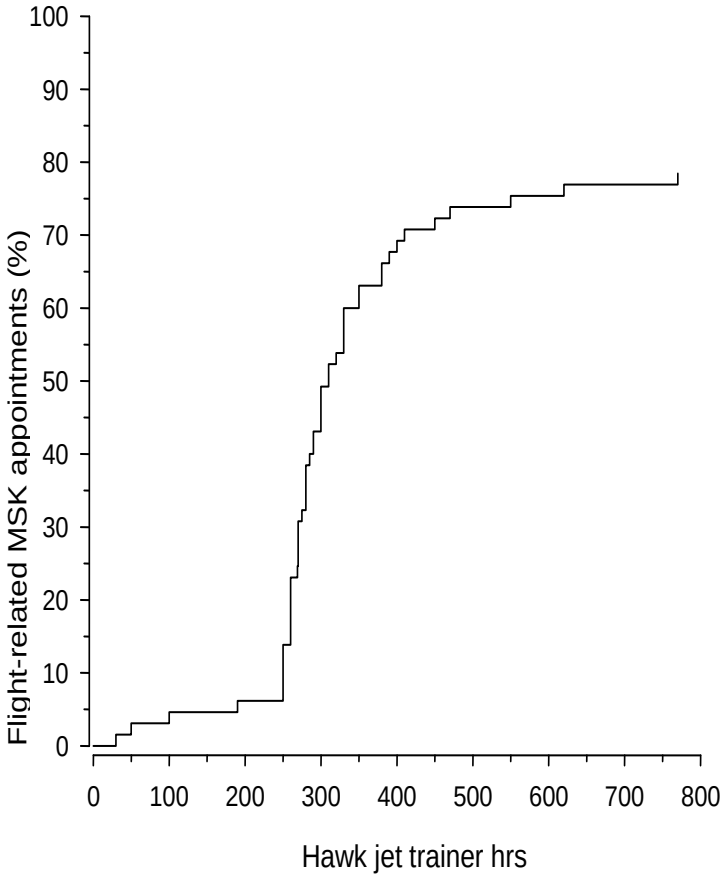
-selection physical fitness (VO_2max, strength)

-67 FiAF pilots, average flight experience +300 hrs (range 40-760)

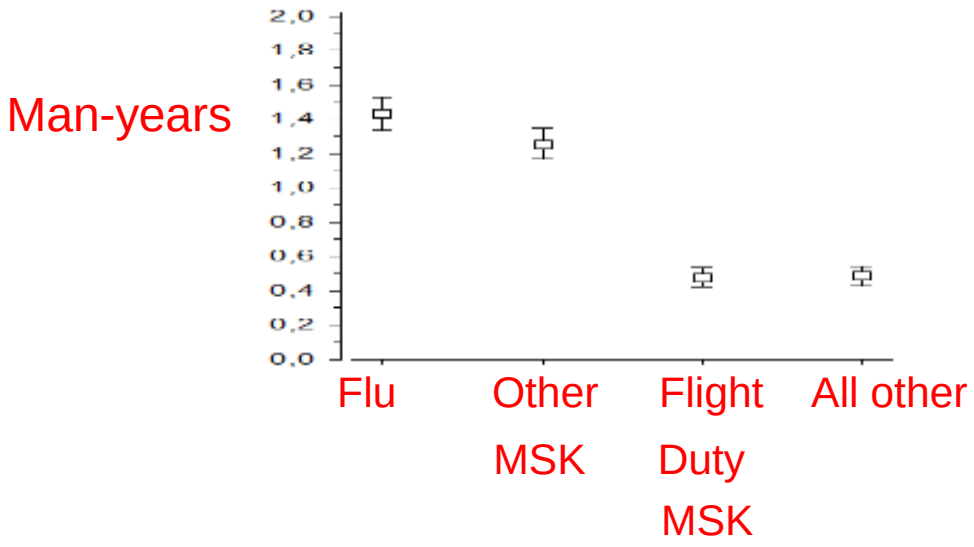
¤605 person/man-years

Prevalence of flight-related MSK

Risk to get flight-related MSK: 3,8 times during the follow-up



Medical appointments in relation with man-years during the early flight career



Loss of flying days due to flight-related MSK

1.Conscript phase:average 1,3 days sick leave (=no flying activities) per pilot (range 2-18)

*in comparison ”Flu” diagnoses almost 5 x more

2.Flight cadet phase: average 2,7 appointments (range 0-19)

*in comparison ”Flu” diagnoses almost 2 x more

3.Young Flight officer phase:average 1,4 appointments (range 0-15)

>> Jet trainer phase together:average 2,4 days sick leave, but…

>if over 6-7 days, very often several weeks, even months brake = severe occupational MSK

Statistics of flight-related MSK in early flight career

-49% of Flight cadets took a medical appointment

-38% of Young flight officers took a medical appointment

>of these 25% made their first appointment already during the beginning of jet trainer phase (=first high G exposure)

Physical performance in the selection phase

(Rintala et al. 2017 Biomed Human Kinet)

Variable	Mean	SD
Age, years	18	-
BMI	24.1	2.3
Aerobic power (W/kg)	4.2	0.5
Anaerobic power (W/kg)	24.9	7.2
Neck flexion (N)	221	52
Neck extension (N)	294	48
Trunk flexion (N)	660	156
Trunk extension (N)	900	146
Ball throw time (ms)	220	15

Flight-related MSK ”protection”:

Statistically less medical appointments, when

-aerobic power >4,2W/kg (55ml/kg/min); p=0,002

-trunk extension >940 N; p=0,005

DISCUSSION AND NEW QUESTIONS

1.Flight-related MSK very common already in early phases of flight syllabus

*slight decrease of prevalence by athlete level physical performance; more personalized *preventive* physical training to achieve better performance and to move forward the limits of detrimental human overloading? Needs a lot of resources…….

*can unfavourable MSK tendency be seen?

*Are the used selection and aeromedical examination factors sufficient enough to make any effect on MSK status? Need of ”multidicipline” scientific approach and wide thinking: aeromedical, sport science, air combat tactical point of view etc. specialist into the same table

2.Follow-up is not yet even in the half of the whole flight-career (averagely)

*carefull continuum of the study up to the retirement phase!!!

*very slow job……

A human selection epidemiologic problem: who will survive….

THANK YOU ALL!